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Alexander - Maps of Vesuvius - 1913

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RUMFORD PROFESSOR AND LECTURER
ON THE APPLICATION OF SCIENCE
TO THE USEFUL ARTS
1834–1845

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IMMANUEL FRIEDLAENDER

MAPS

OF THE

CONE AND OF THE CRATER OF VESUVIUS

With 2 maps and 1 plate

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THE CRATER OF VESUVIUS SEPTEMBER 1911

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Maps of the cone and of the crater of Vesuvius.

by IMMANUEL FRIEDLAENDER

With 2 maps and 1 plate

Before the great eruption of Vesuvius in the year 1906 the eruptive cone had a height of about 1330 m. and a crater not much more than 200 m. in diameter.

Immediately after the eruption the crater had a length from S. W. to N. E. of nearly 700 m. and a breadth of about 600 m. with a depth of 400 to 500 m.

In the succeeding months very considerable downfalls of rocks into the crater occurred and this crumbling away of the rocks was frequently taken for a new eruption in consequence of the avalanches of ashes and stones raising dust-clouds from the crater, which are easily confounded with true eruption clouds.

In the course of time, by this means, the crater became considerably larger, whilst its depth diminished. The last important fall of rocks took place March 12th 1911, when the upper station of the funicular railway of Th. Cook & Son which, after the outburst of 1906 was at 90 m. distance below the lip of the crater, was left as a projection upon its edge, distinctly visible from Naples, the whole south-west lip of the crater having fallen to the level of the station. This station was therefore abandoned and another one erected 80 m. below. (Compare I. Friedlaender: Der Krater des Vesuv im März 1911. Naturwissenschaftliche Wochenschrift. X. Band N. 29, 1911).

Concluding, that after these considerable alterations the crater of Vesuvius had essentially attained a stable condition I had it surveyed in August 1911 by the Neapolitan topographer Alfred Castiglione.

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From his statement the crater had, as the accompanying maps show, a longitunal diameter of about 850 m. and a diameter of almost 700 m. The culminant point of the lip of the crater at the south-west was 1182 m. above sea-level, and the lowest point of the crater-bottom at the north-east was 864 m. An equallay high point on the lip of the crater, of 1182 m. is found at the north-north-west, but in the meantime this part of the lip of the crater has disappeared into the interior.

The lowest points on the lip of the crater are found at the north-east between the numbers 1120 ad 1098 of the map, where a very remarkable gap attains but 1090 m. and a still lower one at the east is 1082 m. above the sea-level. The greatest activity of the fumaroles of the cone of Vesuvius is on the north-eastern declivity, but in the interior of the crater the most remarkable are in the declivity below the destroyed upper station of the funicular railway at the west as well as north-east and on the northern end of the almost semicircular little gulch, which is found at the bottom of the crater.

As a continuation of the zone of fumaroles at the northeast declivity on the floor of the Atrio del Cavallo there is a large number of active fumaroles, arising from little hills, which owe their formation to already existing secondary lava cones which were later on covered by the ashes of 1906.

Those hillocks are, in their structure and appearance perfectly identical with the famous Hornitos of Jorullo of Mexico, which are also blowpipe-cones of lava covered with strata of ashes.

Several quite unimportant fumaroles have appeared since the spring of 1910 to the south-east of the above mentioned fumaroles of the Atrio on the inside walls of the Mt. Somma and are indicated underneath the numbers 1050 and 941 of the map at a height of 850 m. to 820 m.

The temperature of the fumaroles of the Atrio del Cavallo oscillates between 98 and 100°. Nearly the same temperatures are shown by most of the other fumaroles indicated on the map. The sublimations are composed of gypsum and other sulphates as well as sulphur.

The interior of the crater has been visited until now only twice, the first time by C. Capello, the second time by A. Malladra. This gentleman found on the 14th May 1912 295° at the yellow incrustated fumarole beneath the point usually visited by the tourists.

The upper fumaroles on the east slope had a still higher temperature.

The temperature during the first years after 1906 was in-

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creasing and reached, in July 1909, its maximum with about 430° according to measurements of Frank A. Perret, but this decreased until August 1911 to about 100°, rising in the course of the autumn and winter to about 250°. (according to information kindly furnished by Prof. Maliadra).

On the south-west part of the crater bottom a small outburst of ashes took place in May 1906, as results from a photo by Frank A. Perret. The little cone formed in this way was, however, destroyed in June 1910 as I could ascertain by means of a photo.

In december 1911 the valley in the crater at the north-east had somewhat deepened, but it has not been proved, whether by elevation of the bottom of the crater situated towards south-west, or by subsidence. On the south-westerly part of the bottom of the crater a subsidence took place on february 21st 1912.

In general, after the larger eruptions of Vesuvius, the lava begins to gush forth at some point at the bottom of the crater, forming little cones of scoriae. This, however, has not been the case since the eruption of 1906. This repose period of Vesuvius is an extraordinarily long one and it is not yet to be foreseen whether and at what time a new eruption will take place and whether it will be in the central crater, or whether the principal chimney of Vesuvius is so consolidated, that the next eruption will be a lateral one. It can also not be considered as quite impossible, that, as was the case with several volcanoes in the last phase of their activity, it might be, that the character of the eruptions of Vesuvius should change to the formation of a homogeneous dome.

This phenomenon apparently takes place in a volcano only once in the course of time, and it might therefore be, although not very likely, that we may expect the same occurence at Vesuvius.

The most probable thing will be an eruption in the crater; as was the case formerly, but the longer this phenomenon delays, the greater becomes the probability, that one of the other two phenomena, viz. lateral eruption with violent explosions in the beginning, or the formation of a central dome, will take place.

The maps added, which in some particulars may not be absolutely exact, are published with the special intention of serving future visitors as a base for registering the alterations to be noted on the occasion of the next eruption of Vesuvius.

(First published Peterm. Mitt. Nov. 1912).

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History of the eruptions of Vesuvius.

Before the year 79 no eruption is mentioned, but evidently the mountain was known to be a volcano, as even its name, Vesuvius, is said to signify « igneous mountain ».

In the year

63 A. D. a violent local earthquake occurred partly destroying the towns of Pompei and Herculaneum. These towns were afterwards reconstructed.

79 On August 24th occurred the first historic eruption of Vesuvius, described by Pliny. This outburst produced, for the greater part, old material, but undoubtedly with this also much new material - pumice, scoriae and ashes.

The towns of Pompei and Herculaneum were both destroyed by the ashes crushing the roofs.

The temperature in the houses rose occasionally to more than 400°C. as can be proved by the emollescence of glasses, but that was not the case in general and is, at any rate, to be traced to a single hot scoria as well as to some local conflagrations. The Pompeian frescoes, which are in good condition, in no case endured so high a temperature. Pumice and ashes fell dry at first, and only in the later course of eruption somewhat humid, as can be seen from the formation of pisolites in the upper strata. Herculaneum was covered with floods of mud, but it is not known whether these made their appearance during the eruption or later on in consequence of heavy rains.

203 Vesuvius had also in the meantime been active with fire and ashes.

472 Violent outburst of ashes with fall of ashes as far as Constantinople.

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512 Outburst of ashes. The crater was, before this and also afterwards, in strombolian activity.
685 Eruption.
993 Eruption.
1036 Outburst of ashes and lateral eruption of lava. The lava reached the sea.
1049 Floods of lava to the sea.
1138 Eruption.
1139 Violent eruption of ashes and stones, beginning with the appearance of lava and flames in the crater for about 8 days and lasting about a month. The last great eruption of Vesuvius before the year 1631.
1306 Eruption ?
1500 Light eruption of ashes ? After the outburst of 1139 there remained a very large crater. The dustcloud, formed by the downfall of a part of the walls of the crater may easily be mistaken for an eruption of ashes.
1631 The central crater of Vesuvius is described as measuring about 5 miles (8 km.) in circumference and 1000 paces in depth (measured on the road) with wooded borders and pasture-land in the interior. At the bottom of the crater were three small lakes and but one small part of the floor of the crater was bare and covered with lapilli. The lakes had one a bitter, the other a saline water, and the third warm water. In the summer of 1631 there commenced a series of violent, local earthquakes.

On Dec. 16th the great eruption began with considerable ejections of ashes and smoke from the central crater and an outburst of lava at an elevation of about 1000 m. The lava flowed down upon Torre del Greco, Torre Annunziata and Resina. The outburst of 1631 was the greatest eruption of Vesuvius since the year 79.

1660 July, violent eruption of ashes. The mountain kept in moderate activity. In general, three little craters were active. The main crater filled up gradually.
1682 On August 12th a rather violent eruption of ashes took place, the mountain then remained quiet until October.
1685 There occurred an eruption in the interior of the crater with formation of a secondary cone of eruption visible from Naples and soon reaching the lip of the crater.
1689 A somewhat more violent eruption took place. The mountain had remained active the whole time.
1694 April 13th. Small stream of lava from the cone of eruption in the direction of the Salvatore.

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1696 July 31st. Small eruption.

1697 15th of September until November. Small stream of lava from a crevasse on the cone of eruption. The mountain remained active and on the 25th of May of the year 1698 a larger stream of lava appeared in the direction of Resina. When the stream of lava ceased to flow, an overflwoing of lava in the central crater took place. Then followed eruptions of ashes and, later on, violent rains with floods of mud. Ashes with rains were falling at Capri, Sorrento, Castellammare, San Giuliano and Lettere.

1701 July 1st. Lateral outburst with lava and ashes at the east side of the cone.

1704 March 19th. Explosion and fountain of lava at the place of eruption of 1701. The mountain remained active until the middle of the year 1706 and then remained quiet until

1707 July. Violent eruption of ashes. An impetuous stream of lava flowed to the Salvatore. The lava finally almost reached the sea. Fall of ashes at Naples and the Posillipo.

1708 August 14th. Violent eruption of ashes.

1712 February to November. Liquid lava in the crater and strombolian activity.

1713 Small streams of lava in April and May.

1714 January 6th an eruption commenced with many little streams of lava on the cone, eruption of ashes and bombs.

June 15th that activity increased. A stream of lava in the direction of Boscotrecase terminated at 2 km. distance from the sea. Other small streams of lava followed on the 22d and 23d of June.

Upon the 30th of June one writer relates, that the sea withdrew 7 double paces (about 11 m.) and laid dry both fishes and boats. The vineyards were exceedingly damaged by acid rains.

1716 Eruptions of ashes and activity of the fumaroles.

1717 June 6th a crevasse opened on the south-side and a large stream of lava flowed in the direction of Boscotrecase and Torre del Greco.

Another outburst of lava took place from October 9th until October 18th.

1718 Sept. 3d the mountain recommenced its activity. On the 16th, outburst of lava in the direction of Resina and Bosco.

On the 17th two streams flowed on the east side. The mountain remained in activity until the summer of

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1819 and small streams of lava burst out the 8th and 9th July 1719.

1720 On May 7th an eruption of ashes took place, which damaged Ottaiano.

1721 June 6th. Stream of lava on the summit (cone).

1723 March 28th, the level of the sea abated and the wells at Torre del Greco were drained.

June 27th. Stream of lava. On July 8th the activity of the volcano ceased.

1724 Sept. 4 th. Stream of lava at the place of eruption of 1717. A series of small streams of lava followed until May of the year 1725. Repeated similar small outbursts in I726, 1727, 1728, 1730.

1730 In March an abatement of the level of the sea at Torre Annunziata is reported.

1732 Nov. 29th. Earthquake.

1733 Small stream of lava from the summit.

Dec. 25th. Small eruption at the summit.

1737 May 14th. Eruption of ashes. May 16th. streams of lava in the direction of Bosco. Ashes, lapilli and pumice.

May 20th. Stream of lava to Resina and Torre del Greco. Reached the sea on May 21st. During the eruptions of ashes, violent lightnings.

1751 October 22d. The crater of 1737 became gradually filled up to the brim and in the center was surmounted by a little cone with a small crater.

On october 22d the activity grew more violent. On the 25th a crevasse formed at the south-east side of the cone of eruption and two narrow streams of lava flowed forth, one in the direction of the village of Boscoreale, the other to Mauro. After the eruption there formed a funnel of subsidence in the crater.

The streams of lava were moving until November.

1753 A small secondary cone of eruption formed in the crater.

1754 In July this cone of eruption grew remarkably active.

On December 2d the cone of eruption burst at its base and two small streams of lava flowed in the direction of Boscoreale and Mauro while a third flowed in the direction of Boscotrecase.

1755 The central crater was almost filled up and a secondary cone of eruption 80-90 feet in height was in the center of the floor of the crater.

In January two new mouths formed at the south side of the crater. The mountain enlarged constantly by

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means of thrown out material until 1759 and the lip of the crater of 1737 disappeared entirely.

1759 November 24th. Lava burst out at several places on the cone and formed a large stream in the direction of Torre Annunziata.

1760 On February 21st and the following days the central cone was covered with many small streams of lava.

Dec. 23d a crevasse formed on the southern incline of Vesuvius, the inferior end of it being about 300 m. above sea-level. An important stream of lava gushed forth and reached the sea between Torre del Greco and Torre Annunziata. Small cones of eruption of a height of about 70 m. were formed.

1761 January 8th. The crater rim, which, after the outburst of 1760 was already partly fallen down, collapsed in consequence of a summit eruption.

1765-1766 Activity of summit crater with lava, ashes and stones. Flames observed by Hamilton.

1766 March 28th, smoke column from the summit crater brightly illuminated during the night. Violent explosion. The lava gushed forth from the summit crater in the direction of Portici. The activity of the crater with small streams of lava and explosions continued until April 10th and a stream of lava erupted on the eastside of the cinder cone. The flowing of lava lasted until December 10th 1766. The volcano remained quiet until

1767 March, commencing again with ashes, stones and fire-phenomena at the summit. Little streams of lava overflowed the lip of the crater on Sept. 12th. Stones were thrown to a height of more than 500 m.

October 19th a larger stream of lava flowed from the cinder cone into the Atrio del Cavallo.

October 20th and 21st, a heavy fall of ashes at Naples. The eruption lasted until October 26th. The lower end of the stream of lava reached the country above San Giorgio a Cremano. After this eruption the activity of the crater continued.

1770 On March 14th a stream of lava broke forth from a crevasse at the east side of the cone.

On August 10th the lava overflowed the crater and reached the vineyards of Torre del Greco.

Another stream flowed eastward. In the month of December a small stream was flowing into the Atrio del Cavallo.

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1771 On May 14th some lava came out of the crevasse of 1767 in the direction of Resina.

On May 27th a small stream of lava flowed in the direction of Mauro and Ottaiano. Afterwards there appeared a great quantity of white ash.

1773 Small stream of lava from a secondary cone of eruption in the direction of the Canale dell'Arena.

1776 January 3d. A stream of lava on the north-west side from a crevasse on the cinder cone.

1777 Small outburst of lava at the crater of 1760.

1779 The crater of Vesuvius was active in the beginning of the year. Small streams of lava gushed forth from the lateral wall of the cone. The activity of the central crater increased in the first days of August. White scoriae were thrown to a height of 600 m. The lip of the crater was overflowed by lava. A red-brown ash fell at Ottaiano (at the beginning of this eruption there was aqueous vapour) Threads of glass (Pele's hair) were found in abundance.

August 5th. Violent activity.

August 6th. Decrease of the activity and collapse of the little cone of eruption in the crater. Formation of two little mouths.

August 7th. Large fountain of lava at midnight.

August 8th. at 6 in the morning a violent exsplosion. At 9 o'clock in the morning main explosion. Enormous quantities of ashes and lapilli were thrown forth and fell in the direction of Ottaiano. The cloud of ashes reached to almost three times the height of the mountain.

At 2 o'clock in the afternoon a stream gushed forth on the northern flank of the cone and flowed into the Atrio. The explosive phenomena decreased.

In the narrow streets of Ottaiano lapilli and ashes reached the height of 4 feet. The ashes also reached places situated at a distance, as Benevento, Foggia and Monte Mileto.

1784 October 12th. The lava overflowed the crater and reached from the cone to the Atrio. Small streams of lava formed until the end of December 1785. The large crater of 1779 disappeared, reaching the old lip of the crater.

1686 October 31st. Violent activity of the cone of eruption and small stream of lava.

1787 July till December. Small stream of lava in the Atrio del Cavallo. Towards the end of

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1789 some more streams of lava.
1793 Activity at the summit and small streams of lava.
1794 June 15th. Great outburst of lava on the southern side of the mountain, in the plain of Pedimentina, at 500 m. above the sea-level from a crevasse formed after preparatory earthquakes, which had already begun on the 12th. The stream of lava was divided into several branches, the westerly one in the direction of Pugliano, the eastern one in the direction of Torre del Greco, which reached the sea. At the place of eruption there formed four little parasitic cones. At the same time some small streams gushed forth on the east side of the cone. The central crater remained quiet. The mass of the lava which flowed from West to South was estimated at about 5 million cubic metres, the mass of the lava which flowed towards the East at about 2 $^1/_2$ millions cubic metres, the mass of the ejected ashes and lapilli at more than 40 million cubic metres. White ashes were ejected from the cones towards the end of the eruption and this ejection of white ashes lasted almost a month. After the outburst there followed violent floods of mud.
1804 July 26th. Violent earthquake and diminution of wells and of subterranean water.
August 12th. Explosion at the summit.
August 29th. Outburst of lava on the south side of the cone, flowing in the direction of Camaldoli.
1805 August 12th. Outburst of lava on the southern side of the cone, flowing in the direction of Camaldoli and reaching the sea.
1806 Two more streams of lava in the same direction.
1809 September 4th. Outburst of lava on the south-east side of the cone and discharge of lava into the Atrio del Cavallo.
1810 Small stream of lava underneath the Piano della Ginestra.
1813 In the year 1812 already the crater at the summit grew more active. In May of the year 1813 the wells dried up and the sea retired at Torre del Greco. In spite of heavy rains falling in June, July and August the subterranean water-level remained low till the end of September in the whole Vesuvian region.
August 9th. A new mouth was blown out in the crater.
August 26th. Increasing activity.

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October 9th. Two small streams of lava near the summit. A larger stream in the direction of Viulo.

December 25th. Tremendous outburst of ashes and scoriae and two streams of lava, the one towards Fosse Bianco, the other towards Viulo. Two mouths in the central crater. Torre del Greco and Portici covered with ashes. Vesuvius remained active to the end of the year 1814. Monticelli relates, that clorides were formed on the fumaroles until January 1814, whilst he found sulphates in April.

1816 August 7th. Two small streams of lava in the direction of Mauro and Camaldoli.

1817 December 22d. Two new cones in the crater were formed at the two mouths of 1813, both emitting streams of lava, the one in the direction of Camaldoli, the other towards Mauro.

Vesuvius continued fairly active until 1821.

Eruptions of ashes took place in

1818 on August 17th and in

1819 on December 25th, besides the formation of small, very hot streams of lava on the central cone. In the year

1820 in April, more of such streams were visible on the north side.

1822 In the beginning of the year, abatement of subterranean waters.

February 23d and 24th. Stream of lava in the Atrio del Cavallo.

October 23d. Sudden collapse of the central cone. Four streams of lava, the one in the direction of Pedimentina, the other one to Boscoreale, a third in the direction of Resina, a fourth to Torre del Greco. Copious eruption of black ashes and black sand intercalated by single blocks of fresh lava. A large block fell in the estate of the castle of Ottaiano. Fall of ashes with torrential rain. The cone of Vesuvius appeared, after the eruption, about 100 m. lower than Somma and the gigantic new crater had a depth of almost 300 m. In the course of the years, 1828 to 1831 the crater filled up by slight internal eruptions. A small cone of eruption was built in the center and washed the rim of the crater. Small streams of lava gushed forth in the years 1831-1833.

1833 August. Drying up of the subterranean waters. August 13th. Three streams of lava in the direction of Torre del Greco.

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1834 Two cones of eruption existed in the crater, one of them violently active.

August 23 d. A stream of lava gushed forth at the base of the large cinder cone in the direction of the Eremo.

On August 24th the two cones of eruption fell in. A new crevasse was visible on the east side and lava gushed into the Atrio and a large stream in the direction of the Caposecchi.

1838 March 6th. Small stream of lava on the summit.

1839 January. Two streams gushed forth from the crater to the Fossa Grande and Ottaiano. Black ashes fell at Torre del Greco and Torre Annunziata. The crater was a funnel about 100 m. deep. A new central cone was formed in the crater, which, from the year 1841 till 1845, remained in moderate activity with eruptions on the summit and small streams of lava.

1845-50 April 22d 1845, Nov. 13th 1847, December 1849, February 6th 1850 streams of lava were recorded. The summit of Vesuvius was higher than Somma in these years. The central inner cone surmounted by 70 feet the outward lip of the crater.

1850 On February 7th a violent eruption took place at the summit, and a stream of lava gushed forth in the direction of Boscotrecase. The central cone in part collapsed and a new crater, about 50 m. deep, was formed.

1855 May 1st. Outburst of lava on the north side of the cone. The lava gushed forth through the Atrio del Cavallo in the direction of Massa di Somma and Cercola. At that time the crater of the year 1850 had already filled up and two little cones of eruption were formed.

1858 May 21st. Large outburst of lava at the west side of the cone. A copious stream of lava gushed forth towards the West, a second one in the direction of Pompeii,

1860 Two small streams of lava near the stream of 1858.

1861 December 8th. A crevasse above Torre del Greco was formed after a tremendous earthquake, at a height of 240-300 m. from which a medium sized stream of lava flowed in the direction of Torre del Greco, not quite reaching the town. Above the crevasse a series of 8 small cones formed in the shape of a horse shoe open at the lower part. The crevasse of 1861 is situated at the inferior continuation of the crevasse of the year 1794. The outburst of 1861 is the lowest lateral outburst of Vesu-

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vius. Other historic eruptions outside the real cone of ashes were the already mentioned outbursts of 1760 and of 1794. The most important lateral outburst of Vesuvius was the prehistoric eruption which formed the hill of Camaldoli della Torre.

The outburst of 1861 was remarkable for the circumstance, that the central crater remained almost perfectly quiet. In the following years the central crater remained in moderate activity

1865 increasing now and then as in the spring of 1765. A rather important cone of eruption formed inside the summit crater.

1867 A series of lava streams were formed, partly on the south side and partly on the north side, of the cone of ashes.

1868 In the month of November a new crevasse opened on the north side with the formation of several parasitic cones, and the lava gushed forth into the Atrio del Cavallo. After this outburst of lava the central crater remained perfectly quiet.

1870 In the autumn incandescent lava appeared in the crater.

January 13th a little stream of lava gushed forth on the northern part of the cone. The lava was extremely hot and liquid and flowed to the Atrio. Formation of spun glass as in the year 1779. This outburst continued until March. The small cone of eruption began to be active in the autumn of 1871 and the central crater, which had kept moderately active all the time, now increased its activity.

1872 On March 26th (full moon) some more lava gushed forth from a crevasse on the north side towards the Atrio del Cavallo.

April 23 rd. The activity increased and at the same time shakings were registered by the apparatus of the Observatory and a series of small streams of lava of excedingly high temperature appeared, on the cone of ashes in the night of the 24 th. These small streams of lava grew cold in a short time and only one stream was flowing in the Atrio from the crevasse formed last month. On March 26th, at 4 o'clock in the morning a broad crevasse opened on the north-east side of the cone and at the same time the central crater and the mouth of 1870 commenced to emit hot lava. The stream of lava took the westward direction in the Atrio to San Sebastiano and Cercola. A second less remarkable stream of lava

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erupted on the southern side of the cone and took the direction of Camaldoli della Torre.

On the 27th the flowing of the lava ceased almost entirely, only the central crater continued to cast forth considerable quantities of stones and ashes. This activity came to an end by May 1st.

After the eruption the crater showed a diameter of about 250 m. and a depth also of 250 m. and had two mouths. The edge of the crater partly fell in during the next year, half filling the crater. In October 1875 a new mouth was forming on the bottom of the crater, producing steam and ashes with a slight glowing. The lava from the mouth increased gradually and in the year 1878 the crater was entirely filled.

In the following years Vesuvius continued active on the summit. A long series of unimportant lava streams formed on the cone of ashes.

In the year

1883 An elevation formed by such streams of lava at the inferior part of the cone of ashes at the south-east.

The same took place during

1885 In the south-south-west direction. The height of the central cone increased in consequence of this activity.

1891 A remarkable crevasse opened on the northern side of the cone flooding the Atrio with lava. From that crevasse the lava gushed forth until 1894. The lava came out of the lower part of the crevasse and by degrees formed a small cone of lava at the place of ejection. This cone grew in the course of time to 100 m. above the original level and was called « Colle Margherita ».

1895 A similar crevasse formed more to the west, the lava ran from the lower end of the crevasse, erecting in the course of time a more considerable hill of lava, which rose between the cone of ashes and the Observatory to an elevation of 888 m. (about 150 m. above tho original level) and was called « Colle Umberto ». As Matteucci pretends, the level of that hill did not increase by gradual superposition of streams of lava only, but also from an inward intrusion; those observations, however, were judged by Mercalli, with good reason, to be inexact. The activity of the Colle Umberto stopped in the year 1899 and the central cone's activity, having diminished all the time, now became greater.

1900 In May, some violent explosions at the summit.

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1903 Some small outbursts of lava in the vicinity of the summit.

On August 27th a more violent outburst on the northeast side in the Valle d'Inferno. Small cones of eruption were formed on the lower part of the crevasse, the largest one of 70 m.

A considerable part of the Valle d'Inferno was over flowed with lava. According to the analysis of Brun, this lava is rich in hydrocarbon.

1904 The stream of lava ceased September 28th. The summit crater grew more active and a series of small streams of lava appeared at several points. This state of Vesuvius continued until the spring of 1906 preparing for the great eruption in April of that year.

1905 Mai 27th. Outflow of lava on the western slope of the cone.

1906 2-7th. February there was a remarkable increase in the outflow of lava.

1906 April 4th. The violence of the explosions in the central crater increased and shakings were recorded. A series of small streams appeared on the summit, as well on the northwest, as on the east side.

On April 5th a larger stream gushed forth at a lower level, about 800 m. above the sea and proceeded in the direction of Casa Bianca.

On April 6th an aperture formed at about 600 m. above the sea-level in the section of Cognoli di Bosco ejecting liquid lava. This stream took the direction of Boscotrecase.

On April 7th the explosions of the central crater, having continued all the time, grew tremendous and liquid lava gushed forth. The interior lava-level — in spite of the aperture of the lower level (600 m.) — remained very high (over 1000 m.). To the east of this source of lava near Cognoli there was a second flow in the direction of Terzigno, almost covering the stream of 1834. The crater continued to eject liquid lava, so that the whole cone of ashes was covered with red-hot scoriae. Towards the evening the violence of the explosions in the central crater, as well as the quantity of lava in the streams increased. The stream in the direction of Boscotrecase almost reached the cemetery of Torre Annunziata.

In the night of the 7th to 8th of April two tremendous explosions occurred, a great quantity of liquid lava and fresh lapilli were ejected, but with naturally, also

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much old material. The lapilli fell for the greater part in the north-east direction and crushed in, by their weight, the flat roofs of Somma, Ottaiano, San Giuseppe and environs. Insignificant quantities of lapilli reached the town of Nola. The ejection of lapilli continued the next day and the height of the ash column was estimated by an observer at Capri to be 7000, by other observers from 10 to 13000 m.

On April 9th and 10th the eruption of lapilli continued, but with a remarkable decrease and instead of the lapilli and the black ashes there appeared gradually the fine rubified ash.

On the 11th and 12th of April gray ashes were falling and on April 13th and 14th the falling ashes were almost white. Till the end of the month clouds of ashes and smoke were visible at Vesuvius but the fall of ashes outside the cone itself had come to an end. The height of Vesuvius before the outburst attained about 1330 m.; after the outburst Vesuvius showed only 1225 m. Instead of the small crater not even 200 m. in diameter, existing before the eruption, a gigantic gulf was blown out of more than 650 m. diameter with a depth of at least 400 m.

During the first two weeks after the violent eruption of April 8th remarkable hot avalanches of ashes took place on the exterior of the cone, tracing deep furrows, but only in later months, under the influence of rains, there resulted real floods of mud, causing great damage. As to the quantity of lava, the outburst of the year 1906 was equal to that of 1872 surpassing however the latter by far in quantity of ashes and lapilli. In this respect it was almost more remarkable than the outburst of 1779. It is worth mentioning, that, on all the occasions of greater outbursts of lapilli, these fell in north-east direction, damaging Ottaiano and its environs.

On the relatively high content of salts of the Vesuvian ashes of 1906 Johnston Lavis has reported, and Brun has made investigations on their high content of confined gas and especially of hydrocarbons.

The crater of Vesuvius remained for a long time after the outburst of 1906 in the solfatara stage, the clouds of ashes rising occasionally can be traced to avalanches and to the crashing in of rocks. The last great breakdown happened on March 12th 1911.

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The temperature of the hottest and strongest fumaroles, which are to be found on the northern declivity was stated in July 1909 to be 430°. This decreased until August 1911 to not more than 100°, to re-mount in the course of the autumn and winter to 250° at a nearby point. A small eruption of ashes evidently took place at the bottom of the crater in May 1910 with the formation of a little cone, which was destroyed in June by an avalanche.

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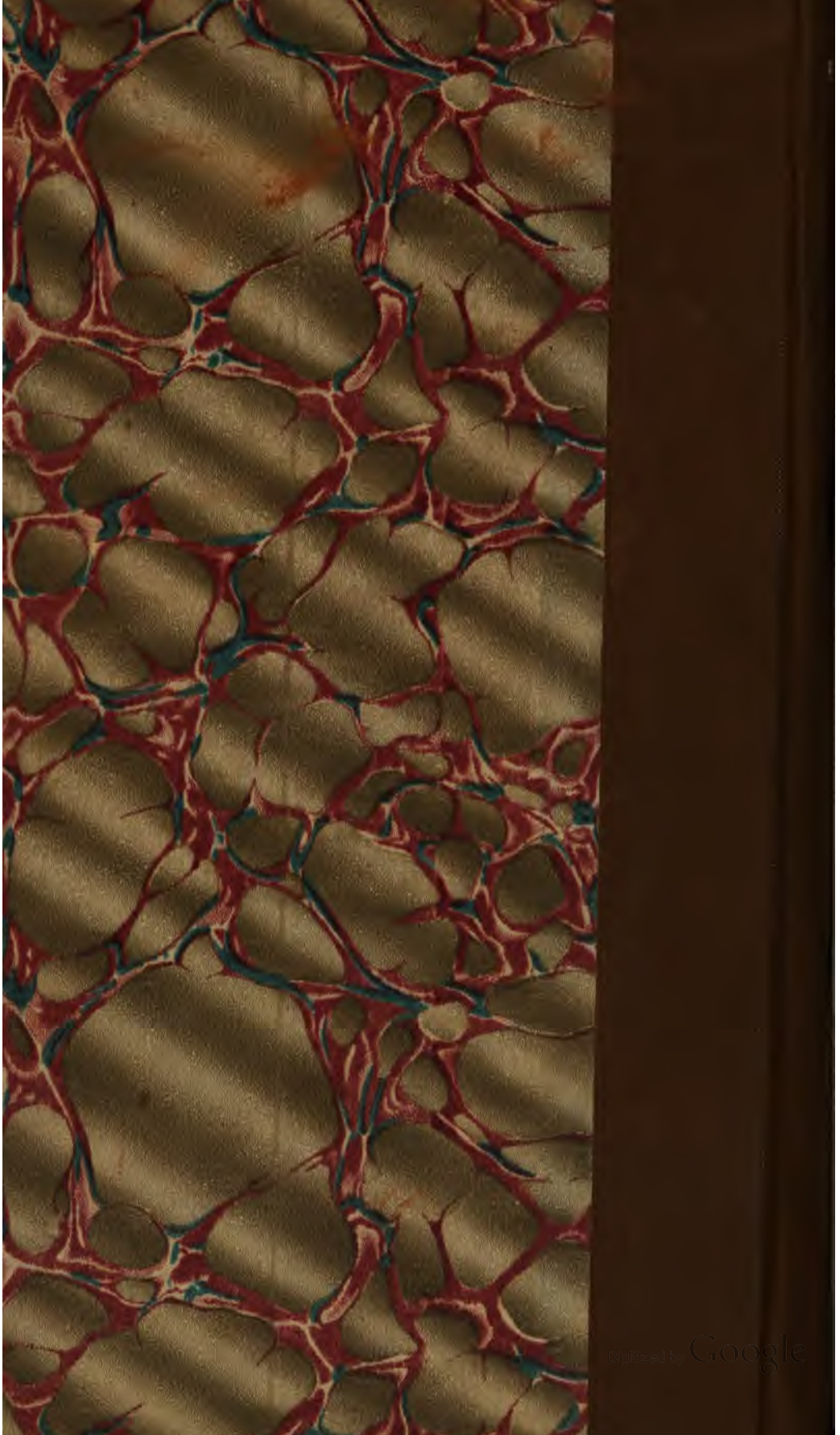
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